P ercents

For questions in the Q uantitative C om parison form at ("Q uantity A " and "Q uantity B " given),the answ er choices are alw ays as follow s:

(A) Q uantity A is greater.
(B) Q uantity B is greater.
(C) The tw o quantities are equal.
(D) The relationship cannot be determ ined from the inform ation given.

For questions follow ed by a num eric entry box ☐,you are to enter your ow n answ er in the box.For questions follow ed by fraction-style num eric entry boxes ☐/☐,you are to enter your answ er in the form of a fraction.Y ou are not required to reduce fractions.For exam ple,if the answ er is 1/4,you m ay enter 25/100 or any equivalent fraction.

A ll num bers used are real num bers.A ll figures are assum ed to lie in a plane unless otherw ise indicated.G eom etric figures are not necessarily draw n to scale.Y ou should assum e,how ever,that lines that appear to be straight are actually straight,points on a line are in the order show n,and all geom etric objects are in the relative positions show n.C oordinate system s,such as *xy*-planes and num ber lines,as w ell as graphical data presentations such as bar charts,circle graphs,and line graphs, *are* draw n to scale.A sym bol that appears m ore than once in a question has the sam e m eaning throughout the question.

1.

Q uantity A	**Q uantity B**
50 as a percent of 30	The percent increase from 30 to 80

2.If K en's salary w ere 20% higher,it w ould be 20% salary? less than Lorena's.If Lorena's salary is $60,000,w hat is K en's

(A) $36,000
(B) $40,000
(C) $42,500
(D) $42,850
(E) $45,000

3.O n a certain m orning,Stock X is w orth $*x*,w here *x* is positive.

Q uantity A	**Q uantity B**
The price of Stock X if it decreases in value	The price of Stock X if it decreases in value

by 12% ,then increases by 18% . by 13% ,then increases by 19% .

4.G reta's salary is *x* thousand dollars per year,and she receives a *y*% raise.A nnika's salary is *y* thousand dollars per year,and she receives an *x*% raise.*x* and *y* are positive integers.

Q uantity A	**Q uantity B**
The dollar am ount of G reta's raise	The dollar am ount of A nnika's raise

5.R oselba's incom e exceeds tw ice Jane's incom e and both pay the sam e percentage of incom e in transportation fees.

Q uantity A	**Q uantity B**
The am ount Jane pays in transportation fees	H alf the am ount R oselba pays in transportation fees

6.250% of *x* is increased by 250% to becom e 350.W hat is the value of *x*?

7.A n item 's price is discounted by 16% .Subsequently,the discounted price is increased by 16% .

Q uantity A	**Q uantity B**
The original price	The price after the discount and increase

8.12 is 5 percent of w hat num ber?

9.7 percent of 9 is w hat percent of 7?

%

10.W hat percent of 13 is 20 percent of 195?

%

11.If 14 is added to 56,by w hat percent does the original num ber increase?

% increase

12.25 percent of 30 is 75 percent of w hat num ber?

13.W hat is the percent increase from 50 to 60?

 %

14.If x is reduced by 30% ,the resulting num ber is 63.The value of x =

15.75 reduced by x% is 54.The value of x =

 %

16.W hat is 230% of 15% of 400?

17.45% of 80 is x% m ore than 24.The value of x =

 %

18.10 percent of 30 percent of w hat num ber is 200 percent of 6?

19.If $y \neq 0$,w hat percent of y percent of 50 is 40 percent of y?

 %

20.If $a \neq 0$,200 percent of 4 percent of a is w hat percent of $a/2$?

 %

21.If positive integer *m* is increased by 20% ,decreased by 25% ,and then increased by 60% ,the resulting num ber is w hat percent of *m* ?

 %

22.

Q uantity A	**Q uantity B**
The price of an item after five consecutive 10% discounts are applied	50% of the price of the item

23.R aym ond borrow ed $450 at 0% interest.If he pays back 0.5% of the total am ount every 7 days,beginning exactly 7 days after the loan w as disbursed,and has thus far paid back $18,w ith the m ost recent paym ent m ade today, how m any days ago did he borrow the m oney?

(A) 6
(B) 8
(C) 25
(D) 42
(E) 56

24.A n investm ent loses half its value in the m orning,and then increases in value by 50% that afternoon;no other changes occur to the value of the investm ent.(A ssum e the investm ent's original value w as a positive num ber.)

Q uantity A	**Q uantity B**
The value of the investm ent before the day's changes	The value of the investm ent after the day's changes

25.A house valued at $200,000 tw o years ago lost 40% of its value in the first year and a further 20% of that reduced value during the second year.

Q uantity A	**Q uantity B**
The current value of the house	$100,000

26.A fter one year at her job,Sharon received a 50% increase on her $1,000 w eekly salary.B ob,w ho originally m ade $1,800 a w eek,took a 20% percent decrease in salary.

Q uantity A	**Q uantity B**
Sharon's new salary	B ob's new salary

27.1% of 200% of 360 is w hat percent of 0.1% of 60?

 %

28.If a num ber is increased by 20% ,decreased by 15% ,and increased by 7% ,the overall percent change is closest to a:

(A) 2% decrease
(B) 2% increase
(C) 9% increase
(D) 12% increase
(E) 14% increase

29.If M ary has half as m any cents as N ora has dollars,then N ora has w hat percent m ore cents than M ary does? (100 cents = 1 dollar)

(A) 100%
(B) 200%
(C) 1,990%
(D) 19,900%
(E) 20,000%

30.The num ber that is 50% greater than 60 is w hat percent less than the num ber that is 20% less than 150?

(A) 5%
(B) 10%
(C) 15%
(D) 20%
(E) 25%

31.A cockroach population doubles every three days.If there w ere *c* cockroaches on June 1st,w hat w as the percent increase in the population on July 1st? (June has 30 days.)

(A) 900%
(B) 1,000%
(C) 9,999%
(D) 102,300%
(E) 102,400%

32.A com puter that w as discounted by 15% sold for $612.W hat w as the price of the com puter before the discount?

(A) $108.00
(B) $520.20
(C) $703.80
(D) $720.00
(E) $744.00

33.

In A pril,the price of fuel increased by 40% .
In M ay,the price rose by another 30% .

Q uantity A **Q uantity B**

The price increase in A pril	The price increase in M ay

34.If 35% of the acreage of a national forest w as destroyed in a w ildfire,and the rem ainder regenerates at a rate of 10% a year,after how m any years,assum ing no further losses,w ill the forest exceed its original acreage?

(A) 10
(B) 8
(C) 5
(D) 4
(E) 3

35.A loysius spends 50% of his incom e on rent,utilities,and insurance,and 20% on food.If he spends 30% of the rem ainder on video gam es and has no other expenditures,w hat percent of his incom e is left after all of the expenditures?

(A) 30%
(B) 21%
(C) 20%
(D) 9%
(E) 0%

36.

A n item costs *x* dollars w here *x* is a positive integer.

Q uantity A	**Q uantity B**
The price of the item after a 10% discount and then a 7% tax are applied	The price of the item after a 7% tax and then a 10% discount are applied

37.

A n item costs *x* dollars w here *x* is a positive integer.

Q uantity A	**Q uantity B**
The price of the item after a 10% discount and then a $10-off coupon are applied	The price of the item after a $10-off coupon and then a 10% discount are applied

38.A dalstein bought a bag of 15 m agic beans for $60.O ne-third of the beans cost $2 each and the rest cost $5 each.If there w as a hole in the bag and all of the m ore expensive beans fell out,the lost beans represented approxim ately w hat percentage of the m oney A dalstein paid for all of them ?

(A) 7%
(B) 13%
(C) 67%
(D) 83%
(E) 88%

39.C offee form erly accounted for 5% of a fam ily's food budget,w hile fresh fruits and vegetables accounted for 20% ,and m eat and dairy accounted for 30% .The fam ily spent the rest of the food budget on fast food and desserts.If the price of coffee doubled and the fam ily reduced the fruit and vegetable share to m eet that expense and spend the sam e overall,the ratio of their new fresh fruit and vegetable expenditures to their fast food and

dessert expenditures equals w hich of the follow ing?

(A) 3/20
(B) 1/5
(C) 1/3
(D) 3/8
(E) 3/5

40.J.R .w eighed 200 pounds before starting a diet on January 1st.H e lost 15% of his original w eight.Then he w ent off the diet and gained 35 pounds by D ecem ber 31st of the sam e year.From the beginning to the end of the year, J.R .'s w eight changed by w hat percent?

(A) +5%
(B) +2.5%
(C) 0%
(D) -2.5%
(E) -5%

41.In 1970,C om pany X had 2000 em ployees,15% of w hom w ere w om en.10% of these w om en w ere executives.In 2012,the com pany had 12,000 em ployees,45% of w hom w ere w om en.If 40% of those w om en w ere executives,w hat is the percent increase in the num ber of w om en executives from 1970 to 2012?

[ ] %

42.75% of all the boys and 48% of all the girls of Sm ith H igh School take civics.If there are 80% as m any boys as girls,w hat percent of all the students take civics?

[ ] %

43.A irline A and A irline B both charge $400 for a certain flight.A irline A then reduces its price by 25% .A irline B reduces its price by 55% but adds $150 in fees.Then,A irline A raises its reduced price by 10% .

Q uantity A	**Q uantity B**
The final price of the flight at A irline A	The final price of the flight at A irline B

44.Jake used to spend $10 for lunch at a restaurant in C hinatow n.The tea served w ith lunch w as free,and Jake left a $2 tip.H ow ever,the restaurant raised its lunch price by 20% and began to charge $1 for tea.Jake continued to order the sam e lunch and tea,and increased his tip so that he w as still tipping the sam e percentage of his total bill.

Q uantity A	**Q uantity B**
Jake's new lunch expenditure	$15.40

45.H alf of a shipm ent of toy trucks w as left at Store W ,25% at Store X ,20% at Store Y ,and the rem aining 20 at Store Z .

Q uantity A	**Q uantity B**

46.

p is 75% of q and $p = 2r$.

Q uantity A	Q uantity B
$0.375q$	r

47.In a class of 40 students,exactly 90% had a low er G PA than Tom .For the new term ,60 new students join Tom ’s class.If Tom ’s G PA w as higher than those of 80% of the new arrivals,w hat percent of the com bined class now has a higher G PA than Tom ?

(A) 86%
(B) 85%
(C) 16%
(D) 15%
(E) 14%

48.

$0 < x < 100$

Q uantity A	Q uantity B
x% of 0.5% of 40,000	0.05% of 2,000% of 40x

P rofit P er Student (in D ollars) at D an’s D ojo,2000-2004

2000	60
2001	80
2002	80
2003	100
2004	162

49.If the percent increase from 2004 to 2005 (not show n) is the sam e as the percent increase from 2000 to 2001, w hat is the profit per student for 2005?

50.If x is 0.5% of y,then y is w hat percent of x?

(A) 199%
(B) 200%
(C) 2,000%
(D) 19,900%

(E) 20,000%

51.B ill pays 20% tax on his gross salary of $5,000 each m onth and spends 25% of the rem aining am ount on rent.

Q uantity A	**Q uantity B**
B ill's tax	B ill's rent

52.Four people shared a dinner w ith an $80 bill and tipped the w aiter 15 percent of this am ount.If each person contributed equally to paying the bill and tip,how m uch did each person pay?

(A) $20.00
(B) $23.00
(C) $23.75
(D) $24.00
(E) $25.00

53.The price of a certain stock rose by 25 percent and then decreased by *y* percent.A fter the decrease,the stock w as back to its original price.

Q uantity A	**Q uantity B**
y%	25%

54.A chem ist is m ixing a solution of acetone and w ater.She currently has 30 ounces m ixed,10 of w hich are acetone. H ow m any ounces of acetone should she add to her current m ixture to attain a 50/50 m ixture of acetone and w ater if no additional w ater is added?

(A) 2.5
(B) 5
(C) 10
(D) 15
(E) 20

55.B y the end of July,a certain baseball team had played 80% of the total gam es to be played that season and had w on 50% of those gam es.O f the rem aining gam es for the season,the team w on 60% .

Q uantity A	**Q uantity B**
Percentage of total gam es w on for the season	52%

56.

Q uantity A	**Q uantity B**
0.002	0.4 percent of 4 percent of 1.25

57.Jane has a 40-ounce m ixture of apple juice and seltzer that is 30% apple juice.If she pours 10 m ore ounces of apple juice into the m ixture,w hat percent of the m ixture w ill be seltzer?

(A) 33%
(B) 44%
(C) 50%
(D) 56%

(E) 67%

58.H alf of the shirts in a closet are w hite and 30% of the rem aining shirts are gray.

Q uantity A	**Q uantity B**
The percent of the shirts in the closet that are not w hite or gray.	20%

59.If 80 percent of the children in a certain room are m ore than ten years old and 20 percent of these children play an organized sport,w hat percent of children in the room are over ten but do not play an organized sport?

(A) 16
(B) 20
(C) 40
(D) 60
(E) 64

60.The length and w idth of a rectangular box are increased by 10% each.

Q uantity A	**Q uantity B**
10%	The percent increase in the volum e of the box

61.The radius of a circle is doubled.

Q uantity A	**Q uantity B**
The percentage that the area of the circle has been increased	400%

62.If 35% of x equals 140,w hat is 20% of x?

(A) 9.8
(B) 39.2
(C) 80
(D) 320
(E) 400

63.A population of a colony of bacteria increases by 20 percent every 3 m inutes.If at 9:00am the colony had a population of 144,000,w hat w as the population of the colony at 8:54am ?

(A) 100,000
(B) 112,000
(C) 120,000
(D) 121,000
(E) 136,000

64.Jane scored 15% higher on her second test than she did on her first test.Jane's score on her third test w as a 25% decrease from the score on her second test.If Jane got a 69 on her third test,w hat w as the score on her first test?

(A) 69
(B) 70
(C) 75
(D) 80

(E) 92

65.The price of an item is greater than $90 and less than $150

Q uantity A	**Q uantity B**
The price of the item after a 10% discount and then a $20 off discount	The price of the item after a $10 off discount and then a 20% off discount

66.Tw o classes participate in a contest stacking blocks.Each person in class 1 stacks 80 percent as m any blocks as each person in class 2 and there are 25 percent m ore people in class 1 than class 2.

Q uantity A	**Q uantity B**
The percent of the total blocks that class 1 stacks	The percent of the total blocks that class 2 stacks

67.*x* is *y* percent of *z*.

Q uantity A	**Q uantity B**
The percent that *z* is of *x*.	$\frac{y}{10,000}$

68.The num ber that is 20 percent less than 300 is w hat percent greater than 180?

(A) 25
(B) $33\frac{1}{3}$
(C) 50
(D) $66\frac{2}{3}$
(E) 75

69.A tank that w as 40% full of oil is em ptied into a 20-gallon bucket.If the oil fills 35% of the bucket's volum e,then w hat is the total capacity of the tank,in gallons?

(A) 8.75
(B) 15
(C) 16
(D) 17.5
(E) 19

70.A full glass of juice is a m ixture of 20% grape juice and 80% apple juice.The contents of the glass are poured into a pitcher that is 200 percent larger than the glass.The rem ainder of the pitcher is filled w ith 16 ounces of w ater. W hat w as the original volum e of grape juice in the m ixture?

(A) 1.6 ounces
(B) 3.2 ounces
(C) 4.8 ounces
(D) 6.4 ounces
(E) 8 ounces

71.If 150 is increased by 60% and then decreased by *y* percent the result is 192.W hat is *y*?

(A) 20
(B) 28
(C) 32
(D) 72
(E) 80

72.A num ber x is 150% greater than 200.W hat percent greater is x than 50% of 500?

(A) 0 (B
) 20 (C)
50 (D)
100
(E) 200

73.M ixture A w eighs 18 gram s and is 50% alum inum .M ixture B w eighs 32 gram s and is 37.5% alum inum .The tw o m ixtures are com bined.

Q uantity A	**Q uantity B**
The percent of the resultant com bination that is not alum inum	58%

74.A stockbroker has m ade a profit on 80% of his 40 trades this year.

Q uantity A	**Q uantity B**
23	The m axim um num ber of consecutive trades that the stockbroker can lose before his profitable trades drop below 50% for the year

75.In 2011,each m em ber of a com m ittee voted for one of tw o possible candidates for president.C andidate A received 40% of the vote and C andidate B received the rem ainder.In 2012,the sam e tw o candidates ran for president.C andidate A received 3 m ore votes than the previous year,a 5% increase in his total num ber of votes. H ow m any votes did C andidate B receive in 2011?

(A) 40
(B) 60
(C) 75
(D) 90
(E) 150

76.A 16 ounce jar of birdseed is 10% sesam e.H ow m uch sesam e m ust be added to m ake the jar 20% sesam e?

(A) 1 ounce
(B) 1.6 ounce
(C) 2 ounce
(D) 2.4 ounce
(E) 4 ounce

77.a,b,and c are positive.

Q uantity A	**Q uantity B**
$(a + b)$% of c	c% of $(a + b)$

78.A certain boat sales lot sells both sailboats and boats that are not sailboats.25% of the boats are used sailboats.O f

non-sailboats,3/5 are new .If 33% of all boats are used,approxim ately w hat percentage of the sailboats are new ?

(A) 31%
(B) 33%
(C) 67%
(D) 68%
(E) 69%

C onference Ticket A dvance D iscounts	
5-29 days in advance	15%
30-59 days in advance	30%
60-89 days in advance	40%

79.H elen bought a ticket for $252.If she’d bought it 1 day later,she w ould have paid $306.H ow m any days in advance did she buy her ticket?

(A) 5
(B) 30
(C) 59
(D) 60
(E) 89

P ercents A nsw ers

1.**(C).**50 as a percent of 30 is $\frac{50}{30} \times 100 = 166.\overline{6}\%$.(N ote: it's incorrect to calculate "50 percent of 30," w hich is 15.This asked for 50 *as a percent* of 30,w hich is equivalent to asking,"W hat percent of 30 is 50?")

To find the percent increase from 30 to 80,use the percent change form ula:

Percent C hange = $\frac{Difference}{Original} \times 100$

Percent C hange = $\frac{80-30}{30} \times 100 = 166.\overline{6}\%$

The tw o quantities are the sam e.N ote that if you set up both quantities first,you w ill be able to see that the tw o quantities are equal w ithout solving (because both equal $\frac{50}{30} \times 100$).

2.**(B).**The question asks for K en's salary,so set a variable: call K en's salary *k*.The problem indicates that Lorena's salary is 60,000.N ow ,translate the equation in the first sentence.

"If K en's salary w ere 20% higher" can be translated as K en's salary + 20% of K en's salary,or $k + 0.2k$."It w ould be 20% less than Lorena's" can be translated as Lorena's salary - 20% of Lorena's salary,or 60,000 - (0.2)(60,000).The last part is equivalent to (0.8)(60,000);use w hichever form you prefer.

$1.2k = 0.8(60{,}000)$
$1.2k = 48{,}000$
$k = 40{,}000$

K en's salary is $40,000.

3.**(A).**The problem never indicates an actual value for the stock,so pick your ow n value.Let the original price of the stock be $100.For Q uantity A ,if the price of the stock decreases by 12% ,then the new price is 88% of the original, or $88.If that price then increases by 18% ,then the final price of the stock is 88(1.18) = $103.84.

For Q uantity B ,if the $100 price decreases by 13% ,the new price is 87% of $100,or $87.If that price then increases by 19% ,then the final price of the stock is 87(1.19) = $103.53.

Q uantity A is slightly larger.

4.**(C).**B ecause the problem never indicates real values,you can pick your ow n sm art num bers.If x = 100 and y = 50, then:

G reta's salary is $100,000 and she w ill receive a 50% raise.G reta's raise,therefore,is $50,000.

A nnika's salary is $50,000 and she w ill receive a 100% raise.A nnika's raise,therefore,is $50,000.

The tw o quantities are the sam e.This w ill w ork for any num bers you choose for *x* and *y*,because *x* percent of *y* = *y* percent of *x*.This fact holds for any tw o num bers — just as 50% of 100 = 100% of 50,it is also true that 1% of 2,000 = 2,000% of 1,or *a*% of *b* = *b*% of *a*.

5.**(B).**R oselba's incom e is m ore than tw ice as great as Jane's incom e.If both pay the sam e percentage of incom e in transportation fees,that m eans R oselba m ust pay *m ore* than tw ice as m uch as Jane in transportation fees.Q uantity B is greater.

A lternatively,you can use sm art num bers.C all Jane's incom e 100.R oselba's incom e,then,is greater than 200.If both pay 10% in transportation fees,then Jane pays $10 and R oselba pays m ore than $20.H alf of R oselba's am ount equals m ore than $10.

6.**40.**To begin,250% of *x* is equal to $\frac{250}{100}x$, or $2.5x$

H ow ever,w hen you *increase* a num ber by 250% ,you are N O T sim ply m ultiplying it by 2.5.R ather,you are finding 250% (or 2.5 tim es) that num ber and then *adding it back to the original.*(For exam ple,100% O F 15 equals 15,but IN C R EA SIN G 15 by 100% m eans doubling it: 15 + 15 = 30.)

Thus,to increase a num ber by 250% ,you are adding 100% to 250% for a total of 350% .Therefore,m ultiply by 3.5 (N O T 2.5).

$2.5x(3.5) = 350$
$8.75x =$
$350\ x = 40$

40 is the final answ er.If you are unsure of the logic behind these calculations,check your answ er:

250% of 40 equals 2.5(40),or 100.

N ext,100 is IN C R EA SED by 250% ,so take 250% of 100,or 250,and add it back to the original 100: 100 + 250 = 350.The problem does indicate that the final answ er is 350,so you have just proven that *x* does indeed equal 40.

7.**(A).**The problem doesn't indicate a specific value anyw here,so you can choose your ow n sm art num ber.B ecause this is a percent problem ,call the original price $100.Q uantity A is equal to $100.

D ecreasing a value by 16% is the sam e as taking 100 - 16 = 84% of the num ber: so (0.84)(100) = $84.To increase the value by 16% ,take 116% of the num ber,or m ultiply by 1.16: (1.16)(84) = $97.44.

Q uantity A is larger.

8.**240.**Translate the question as 12 = 0.05*x* and solve on the calculator.*x* = 240.A lternatively,translate the question

as $12 = \frac{5}{100}x$ and solve on paper:

$$12 = \frac{1}{20}x$$

$$(12)(20) = x$$

$$x = 240$$

9.**9**.A lw ays translate the phrase “w hat percent” as $\frac{x}{100}$.Translate the question as:

$$0.07(9) = \frac{x}{100}(7)$$

$$0.63 = \frac{7x}{100}$$

$$63 = 7x$$

$$9 = x$$

Incidentally,the pattern “*x* percent of *y* = *y* percent of *x*” alw ays holds true! H ere,7% of 9 = 9% of 7,but it is also true that 2% of 57 = 57% of 2,etc.This w orks w ith any tw o num bers.If you notice this,then you can “fill in the blank” on the answ er im m ediately: “w hat percent” m ust be 9 percent.

Finally,notice that the answ er is 9 and not 0.09 or 9% .The question asks “w hat percent,” so the percent is already incorporated into the sentence — the “w hat” by itself represents only the num ber itself,9.

10.**300.**A lw ays translate the phrase “w hat percent” as $\frac{x}{100}$.Translate the question as:

$$\frac{x}{100}(13) = 0.2(195)$$

$$\frac{13x}{100} = 39$$

$$13x = 3,900$$

$$x = 300$$

A lternatively,take 20 percent of 195 (0.2 × 195 = 39) and rephrase the question: “W hat percent of 13 is 39?” Since 39 is three tim es as big as 13,the answ er is 300% .

11.**25% .**In this problem ,the change is 14 and the original num ber is 56.U se the percent change form ula:

$$\text{Percent C hange} = \frac{Difference}{Original} \times 100$$

14/56 = 1/4 or 0.25.M ultiply by 100 to get 25% .

N otice that you never need to find the new num ber (14 + 56 = 70),as you have only been asked about the percent increase,not the new value.

12.**10.**Translate the question as 0.25(30) = 0.75*x* and solve on the calculator.*x* = 10.

A lternatively,w rite the percentages in sim plified fraction form and solve on paper:

$$\frac{1}{4}(30) = \frac{3}{4}x$$

$$30 = 3x$$

$$x = 10$$

13.**20% increase.**U se the percent change form ula:

$$\text{Percent C hange} = \frac{Difference}{Original} \times 100$$

The difference is 60 - 50 = 10 and the original is 50.10/50 = 1/5 or 0.2.M ultiply by 100 to get 20% .

14.**90.**B ecause 30% less than *x* is the sam e as 70% of *x*,you can translate as follow s: 0.7*x* = 63.U se the calculator to get *x* = 90.A lternatively,solve on paper:

$$\frac{7}{10}x = 63$$

$$x = (63)\left(\frac{10}{7}\right)$$

$$x = (9)(10)$$

$$x = 90$$

15.**28.**R ew ord the given inform ation as “75 m inus *x* percent of 75 is 54.”

$$75-\frac{75}{100}x=54$$

$$75-54=\frac{3}{4}x$$

$$21\left(\frac{4}{3}\right)=x$$

$$28=x$$

16.**138.**Translate into decim als (for the percentages,m ove the decim al tw o places to the left) and use the calculator to solve:

x = 2.3(0.15)(400)
x = 138

A lternatively,translate into fractions and solve on paper:

$$\frac{230}{100}\times\frac{15}{100}\times 400=$$

$$\frac{23}{10}\times\frac{15}{1}\times 4=$$

$$\frac{23}{2}\times\frac{3}{1}\times 4=$$

$$\frac{23}{1}\times\frac{3}{1}\times 2=138$$

17.**50.**The left-hand side of the equation is given: 45% of 80 is (0.45)(80) = 36.The problem then becom es: “36 is *x*% m ore than 24.” From this step,there are tw o possible approaches.

O ne approach is to translate the equation and solve:

$$36 = 24 + \frac{x}{100}(24) =$$

$$12 = \frac{24x}{100}$$

$$12\left(\frac{100}{24}\right) = x$$

$$50 = x$$

A lternatively,the increase (36 - 24) is 12,so rephrase the statem ent as “12 is *x*% of 24.” If you recognize that 12 is half of 24,then you know *x* m ust be 50% .Y ou can also translate and solve:

$$12 = \frac{x}{100}(24)$$

$$12\left(\frac{100}{24}\right) = x$$

$$50 = x$$

18.**400.**Translate as decim als and use the calculator to solve,keeping in m ind that taking 200% of a num ber is the sam e as doubling it,or m ultiplying by 2:

0.10(0.30)*x* =
2(6) 0.03*x* = 12
x = 400

A lternatively,translate as fractions and solve on paper:

$$\left(\frac{1}{10}\right)\left(\frac{3}{10}\right)x = 2(6)$$

$$x = 12\left(\frac{100}{3}\right)$$

$$x = 400$$

19.**80.**The question already contains a variable (*y*).U se another variable to represent the desired value.R epresent “w hat” w ith the variable *x*,and isolate *x* to solve.N otice that by the end,the *y* variables cancel out.

$$\left(\frac{x}{100}\right)\left(\frac{y}{100}\right)50 = \left(\frac{40}{100}\right)y$$

A t this point,there are *m any* options for sim plifying,but do sim plify before you start m ultiplying anything.H ere is one w ay to sim plify:

$$\left(\frac{x}{100}\right)\left(\frac{y}{2}\right)=\left(\frac{2}{5}\right)y$$

$$x=\frac{2y(100)(2)}{5y}$$

$$x=80$$

20.**16.**200% of 4% is the sam e as 2 × 4% (note that 200% equals the plain num ber 2),or 8% .R ephrase the question as “8% of *a* is w hat percent of *a*/2?” W ithout translating to an equation,you can sim plify by m ultiplying both sides of the “equation” by 2 (rem em ber that “is” m eans “equals”):

8% of *a* is w hat percent of *a*/2?

16% of *a* is w hat percent of *a*?

The answ er is 16.

A lternatively,translate the w ords into m ath;this w ill take longer,but this m ethod does w ork if you’re not com fortable “thinking through” the m ath as show n above:

$$\left(\frac{200}{100}\right)\left(\frac{4}{100}\right)a=\left(\frac{x}{100}\right)\left(\frac{a}{2}\right)$$

$$\left(\frac{2}{25}\right)a=\frac{xa}{200}$$

$$\left(\frac{2}{25}\right)a\left(\frac{200}{a}\right)=x$$

$$16=x$$

21.**144.**If *m* is increased by 20% ,decreased by 25% ,and then increased by 60% ,it is being m ultiplied by 1.2,then 0.75,then 1.6.Since (1.2)(0.75)(1.6) = 1.44,doing these m anipulations is the sam e as increasing by 44% ,or taking 144% of a num ber (this is true regardless of the value of *m*).

A lternatively,pick a real value for *m* .B ecause this is a percent problem ,100 is a good num ber to pick.First,100 is increased by 20% : (100)(1.2) = 120.N ext,120 is decreased by 25% ,w hich is the sam e as m ultiplying by 75% : (120) (0.75) = 90.Finally,90 is increased by 60% : (90)(1.6) = 144.The new num ber is 144 and the starting num ber w as 100,so the new num ber is 144/100% of the original num ber,or 144% .

22.**(A).**Say the item costs $100.A fter the first 10% discount,the item costs $90.A fter the second,the item costs

$81 (the new discount is only $9,or 10% of 90).A fter the third discount,the item costs $81 - $8.10 = $72.90.W hat is the trend here? The cost goes dow n w ith each discount,yes,but the discount itself also gets sm aller each tim e;it is only a $10 discount the very first tim e.The total of the five discounts,then,w ill be som ething less than $50.

If the item costs $100 to start,then the value for Q uantity B w ill be $50,or a total discount of $50.This is larger than the total discount described for Q uantity A .

Finally,m ake sure you answ er (A) for the higher price — don't accidentally pick (B) for the "better deal"!

23.**(E).**1% of $450 is $4.50,so 0.5% is $2.25.That's the am ount R aym ond pays back every w eek.B ecause he has paid back $18 in total,divide 18 by 2.25 to determ ine the total num ber of paym ents: $18/$2.25 = 8.

So R aym ond has m ade 8 paym ents,once every 7 days.The paym ents them selves spread over only a 7-w eek period (in the sam e w ay that 2 paym ents spread over only a 1-w eek period).R aym ond w aited 1 w eek to begin repaym ent, how ever,so a total of 8 w eeks,or 56 days,have passed since he borrow ed the m oney.The answ er is (E).

24.**(A).**The investm ent's value first decreases by 50% ,then increases by 50% .If the investm ent begin at x dollars, $x(0.50)(1.5) = 0.75x$.The investm ent ends at 75% of its original value.The value after the changes is low er than the value before the changes.

A lternatively,choose a sm art num ber to test.If x = $100,then the investm ent first decreased to $50,and then increased from $50 to $75.If Q uantity A = 100,then Q uantity B = 75.

Finally,you could solve this question w ith logic.The 50% decrease is taken as a percentage of the original num ber. The 50% increase,how ever,is taken as a percentage of the new ,*sm aller* num ber.The increase,therefore,m ust be sm aller than the decrease.

25.**(B).**To reduce $200,000 by 40% ,m ultiply by 0.6 (reducing by 40% is the sam e as keeping 60%): 200,000(0.6) = 120,000.

To reduce 120,000 by 20% ,m ultiply by 0.8 (reducing by 20% is the sam e as keeping 80%): 120,000(0.8) = 96,000. The answ er is (B).

26.**(A).**Sharon's 50% increase raised her salary by half,to 1,000(1.5) = $1,500.A 20% decrease from $1,800 reduces B ob's salary to (1,800)(0.8) = $1,440.

27.**12,000% .**Translate the statem ent into an equation.Since one of the percentages is a variable,fractions are preferable to decim als:

$$\frac{1}{100}\times\frac{200}{100}\times 360=\frac{x}{100}\times\frac{0.1}{100}\times 60$$

B ecause 100 appears tw ice on the bottom of both sides of the equation,m ultiply each side of the equation by 10,000 (or 100 tw ice) to cancel the 100's out:

$$\frac{1}{\cancel{100}} \times \frac{200}{\cancel{100}} \times 360 = \frac{x}{\cancel{100}} \times \frac{0.1}{\cancel{100}} \times 60$$

$$200 \times 360 = x(0.1)(60)$$

$$\frac{200 \times 360}{60} = x\left(\frac{1}{10}\right)$$

$$200 \times 6 \times 10 = x$$

$$x = 12{,}000$$

The answ er is 12,000% .(The phrase “w hat percent” translates into m ath as $\frac{x}{100}$.A dditionally, $\frac{12{,}000}{100}$,is the sam e thing as 12,000% ,just as $\frac{50}{100}$ is equal to 50% .W hile 12,000% m ay seem quite large,it is correct.)

A lternatively,you can use decim als,though you still have to w rite “w hat percent” as a fraction;also,use the calculator to solve:

$$(0.01)(2)(360) = \frac{x}{100}(0.001)(60)$$

$$7.2 = \frac{x}{100}(0.06)$$

$$120 = \frac{x}{100}$$

$$12{,}000 = x$$

28.**(C).**Increasing by 20% is equivalent to m ultiplying by 1.2,decreasing by 15% is equivalent to m ultiplying by 1 - 0.15,or 0.85,and increasing by 7% is equivalent to m ultiplying by 1.07:

$x(1.2)(0.85)(1.07) = x(1.0914)$

O verall,these three changes are equivalent to m ultiplying by 1.0914,or increasing by 9.14% .C hoice (C) is closest.

Y ou *cannot* sim ply add 20 + 7 and subtract 15 to get a 12% increase.These percents cannot be added and subtracted because 20% is a percent of the original num ber,w hile 15% is a percent of the new ,increased num ber,and so on.

A lternatively,you can also use a sm art num ber.If the original num ber is 100,first increase 100 by 20% : 100 + 20 =120.N ext,decrease 120 by 15% : 120 - 18 = 102 or 120(0.85) = 102.Finally,increase 102 by 7% .N ote: the question indicates that you’re trying to find the “closest” answ er: a quick glance at the answ ers show s that they are relatively spread apart.It w ill be sufficient,then,to approxim ate the last step: 102 is alm ost 100 and 7% of 100 is 7.

The increase,then,is 102 + 7 = 109.

C om pared to the original figure,100,you have increased the num ber by about 9,or approxim ately 9% .

29.**(D).**Y ou can use sm art num bers to solve this problem .If M ary has half as m any cents as N ora has dollars,then,as an exam ple,if N ora had $10,M ary w ould have 5 cents.N ora's $10 equals 1,000 cents.To determ ine w hat *percent m ore* cents N ora has,use the percent change form ula:

$$\text{Percent Change} = \frac{\textit{Difference}}{\textit{Original}} \times 100$$

$$\text{Percent Change} = \frac{1{,}000 - 5}{5} \times 100 = 19{,}900\%$$

A ny exam ple you use w here "M ary has half as m any cents as N ora has dollars" w ill yield the sam e result.N ote that you m ust use the percent change form ula — a percent *m ore* (or percent increase) is not the sam e as a percent *of* som ething.

To do the problem algebraically (w hich is *m uch* harder than using an exam ple,as above),use *M* for M ary's cents and *N* for N ora's cents.D ivide *N* by 100 in order to convert from cents to dollars: $\frac{N}{100}$ and set up an equation to reflect that M ary has half as m any cents as N ora has dollars:

$$M = \frac{1}{2}\left(\frac{N}{100}\right)$$

$$M = \frac{N}{200}$$

$$200M = N$$

Therefore,N ora has 200 tim es as m any cents.200 tim es A S M A N Y is 199 tim es M O R E .To convert 199 tim es M O R E to a percent,add tw o zeros to get 19,900% .

30.**(E).**R ather than trying to w rite out the w hole statem ent as m ath,note that "the num ber that is 50% greater than 60" can be calculated: 1.5(60) = 90.Sim ilarly,"the num ber that is 20% less than 150" is 0.8(150) = 120.The question can be rephrased as "90 is w hat percent less than 120?" U se the percent change form ula.Since you w ant a "percent *less,*" the "original" num ber is 120:

$$\text{Percent Change} = \frac{\textit{Difference}}{\textit{Original}} \times 100 = \frac{30}{120} \times 100 = 25\%$$

31.**(D).**The percent increase is the difference betw een the am ounts divided by the original,converted to a percentage. If the population doubles,m athem atically the increase can be w ritten as a pow er of 2.In the 30-day interval,if the original population is 1,it w ill double to 2 after three days — so,21 represents the population after the first increase,

the second increase w ould then be 2^2 and so on.Since there are ten increases,the final population w ould be 2^{10} or 1,024.Therefore,the difference,1024 - 1,is 1023.U se the percent change form ula to calculate percent increase:

$$\text{Percent Change} = \frac{Difference}{Original} \times 100 = \frac{1023}{1} \times 100 = 102,300\%$$

N ote that the new num ber *is* 102,400% of the original,but that w as not the question asked — the percent *increase* is 102,300% .

32.**(D).**C all the original price *x*.That price is discounted by 15% to get 612:

$0.85x = \$612$
$x = \$720$

D o not attem pt to add 15% of $612 to $612.The 15% figure is a percentage of the unknow n original num ber,not of $612.

33.**(B).**C all the original price *x*.In A pril,the total price w as $1.4x$.The price *increase* w as $1.4x - 1x = 0.4x$.

In M ay,the price increased an additional 30% over A pril's price of $1.4x$.Thus,the total price w as $1.82x$.The price increase w as $1.82x - 1.4x =$ $(1.3)(1.4)x$,or $0.42x$.

Since $0.42x$ (42% of x) is larger than $0.4x$ (40% of x),Q uantity B is larger.

A lternatively,use sm art num bers.If the original price is $100,A pril's increase w ould result in a price of $140 and M ay's increase w ould be (1.3)(140) = $182.Thus,A pril's increase w as $40 and M ay's increase w as $42.M ay's increase w ill be larger no m atter w hat num ber you pick as the starting price (it is reasonable in G R E problem s to assum e that a "price" m ust be a positive num ber.)

34.**(C).**Picking num bers is a good strategy here.If the forest had 100 acres:

A fter the fire: 65 acres
A fter 1 year: (65)(1.1) = 71.5 acres
A fter 2 years: (71.5)(1.1) = 78.65 acres
A fter 3 years: (78.65)(1.1) = 86.515 acres
A fter 4 years: (86.515)(1.1) = 95.1665 acres
A fter 5 years: (95.1665)(1.1) = 104.68315 acres

N ote that each solution is m ultiplied by 1.1,so you can keep m ultiplying by 1.1 using the calculator — just be extra careful to keep track of how m any tim es you m ultiply!

A lternatively,w rite an inequality in w hich a is the original acreage and y is the num ber of years:

$(0.65a)(1.1)^y > a$

N otice that the *a* values cancel out:

$$(0.65)(1.1)^y > 1$$

The G R E calculator is not equipped to solve this directly (you w ould need to use a logarithm ,a topic not tested on the G R E),so instead plug in the answ er choices for *y*,starting w ith the sm allest value (3),until you find the sm allest one that w orks.5 is the sm allest value that m akes the inequality true.

35.**(B).**The 50% spent on rent,utilities,and insurance and the 20% spent on food are both percents of the total,so you can sim ply add the percents.50% + 20% = 70% .A fter these expenditures,A loysius has 30% left.H e then spends 30% *of the rem aining 30%* on video gam es.30% of 30% = 0.30 × 0.30 = 0.09,or 9% .30% - 9% = 21% rem aining.

A lternatively,use sm art num bers.If A loysius's incom e is $100,he w ould spend $50 on rent,utilities,and insurance, and $20 on food,for a total of $70.O f his rem aining $30,he w ould spend 30% ,or $9,on video gam es,leaving $21, or 21% of the original am ount.

36.**(C).**This question can be done in one of tw o w ays.If you rem em ber that all m ultiplications happen sim ultaneously (in term s of order of operations),you can sim ply look at this question and see that the order in w hich the discount and the tax are applied is irrelevant,so the answ er m ust be (C).In other w ords,if *x* is the original price,(0.9)(1.07)*x* = (1.07)(0.9)*x*.

A lternatively,pick a real num ber and use the calculator.B ecause the problem deals w ith percentages,try 100.For Q uantity A ,first m ultiply by 0.9 to reflect the 10% discount: (100)(0.9) = $90.N ext,m ultiply by 1.07 to apply the 7% tax: (90)(1.07) = $96.30

For Q uantity B ,first m ultiply by 1.07 to get $107 and then by 0.9 to get $96.30.

The answ er is (C).

37.**(B).**Y ou m ay be tem pted to pick (C) here right aw ay,but check the w ork;this problem m ixes m ultiplication and subtraction.Pick a num ber to test the tw o quantities;because the problem deals w ith percentages,100 is a good num ber to pick.

For Q uantity A ,a 10% discount w ould reduce the $100 price to $90,and $10 off $90 w ould reduce the price to $80.

For Q uantity B ,a $10-off coupon w ould reduce the price to $90,and then 10% off w ould reduce the price to $81,not $80! The discount is only $9 because you take 10% of 90,not 10% of 100.

A lternatively,you could derive both quantities algebraically:

Q uantity A = 0.9*x* - 10

Q uantity B = 0.9(*x* - 10) = 0.9*x* - 9

The answ er is (B).N ote that the order of the tw o discounts m attered here because one change w as m ultiplication (10% off) and one w as subtraction ($10 off).If both changes had been the sam e operation (e.g.,both m ultiplication), the order w ould not have m attered.

38.**(D).**1/3 of all the beans is 5 beans.These 5 beans each cost $2,for a total of $10.The rem aining 10 beans cost $5 each,for a total of $50.If all of these m ore expensive beans are lost,then the lost beans represent $\frac{50}{60}$ of all the m oney paid.To convert to a percent: $\frac{50}{60} \times 100 = 83.\overline{3}\ \%.$

39.**(C).**O riginally,the three figures given total 55% ,so 45% w as spent on fast food and desserts.If coffee doubled in price and the overall budget did not increase,coffee w ould then be 10% of the total,and that extra 5% w ould be taken from the fruit and vegetable expenditures.Thus,fruits and vegetables becom e 15% of the total w hile fast food and dessert stays at 45% .The ratio is 15/45,w hich reduces to 1/3.

40.**(B).**H is loss w as 15% of 200,or 30 pounds.If he then gained 35 pounds,he finished the year w eighing 205.

$$\text{Percent Change} = \frac{\textit{Difference}}{\textit{Original}} \times 100$$

$$\text{Percent Change} = \frac{5}{200} \times 100 = 2.5\%$$

B e sure to select (B) for a 2.5% increase,and not (D) for a 2.5% decrease.

41.**7,100% .**In 1970,C om pany X had 0.15(2000) = 300 fem ale em ployees.O f those,0.10(300) = 30 w ere fem ale executives.

In 2012,C om pany X had 0.45(12,000) = 5,400 fem ale em ployees.O f those,0.40(5,400) = 2,160 w ere fem ale executives.

$$\text{Percent Change} = \frac{\textit{Difference}}{\textit{Original}} \times 100$$

$$\text{Percent Change} = \frac{2130}{30} \times 100 = 7{,}100\%$$

42.**60% .**U se sm art num bers.There are 80% as m any boys as girls,so choose 100 for the girls (100 is a good num ber to pick for percent problem s).The boys,then,m ust be (100)(0.8) = 80.75% of all the boys take civics, therefore there are 0.75(80) = 60 boys w ho take civics.48% of all the girls take civics,therefore there are 0.48(100) = 48 girls w ho take civics.

60 + 48 = 108 students take civics and there are 180 total students:

$$\frac{108}{180} \times 100 = 60\%$$

43.**(C).**A irline A reduces its price by 25% to (400)(0.75) = $300 but then raises that price by 10% to (300)(1.1) = $330.A irline B reduces its fare to (400)(0.45) = $180 but adds $150 in fees,bringing the total price to 180 + 150 = $330.

44.**(A).**The new lunch price is (10)(1.2) = $12.W ith the tea charge,the new lunch bill is 12 + 1 = $13.Since Jake leaves a 20% tip,the new tip is (0.20)(13) = $2.60,so his new cost is 13 + 2.6 = $15.60.This is larger than Q uantity B .

45.**(C).**This problem can be solved algebraically,using *t* as the total.N ote: because the equation requires addition,it is easier to use decim als than fractions.(A dding fractions requires finding a com m on denom inator.)

$0.5t + 0.25t + 0.2t + 20$
$= t\ 0.95t + 20 = t$
$20 = 0.05t$
$t = 400$

Thus,the trucks left at Store X = 0.25(400) = 100 and the trucks left at Store Y = 0.20(400) = 80.The difference is 20.

A lternatively,Store W = 50% ,Store X = 25% ,and Store Y = 20% .C ollectively,these three stores received 95% of the trucks,so Store Z receives 5% of the trucks.Y ou know that Store Z receives 20 trucks,so 5% = 20 trucks.The difference betw een Store X (25%) and Store Y (20%) is also 5% ,so that 5% difference is also 20.

46.**(C).**W rite an equation from the first part of the given inform ation: $p = 0.75q$.Since $p = 2r$,substitute $2r$ for p in the first equation:

$2r = 0.75q$
$r = 0.375q$

The tw o quantities are equal.

A lternatively,use sm art num bers.If q is 8,then p is (8)(0.75) = 6.(N ote: because you have to m ultiply q by 0.75,or 3/4,try to pick som ething divisible by 4 for q,so that p w ill be an integer.) Therefore,r is 6/2 = 3.

$0.375q$ = (0.375)(8) = 3.The value for r is also 3,so the tw o quantities are equal.

47.**(D).**90% of 40 students or 0.9(40) = 36 students had a low er G PA than Tom .O f the 60 new students,80% or 0.80(60) = 48 had a low er G PA than Tom .Thus,36 + 48 = 84 students in the new ,larger class have G PA s low er than Tom .

The new class has 100 people,84 of w hom have low er G PA s than Tom .There are 16 people unaccounted for — don’t forget that Tom is one of them ! Since Tom has the low est G PA of this group of 16 people,there are 15 people above him .Since the class has exactly 100 people,15/100 = 15% .

48.**(A).**W hen a percentage contains a variable,use fractions to translate.Q uantity A is equal to:

$$\frac{x}{100}\times\frac{0.5}{100}\times\frac{40{,}000}{1}=x(0.5)(4)=2x$$

Q uantity B is equal to:

$$\frac{0.05}{100}\times\frac{2{,}000}{100}\times\frac{40x}{1}=(0.05)(2)(4x)=0.4x$$

Since *x* is positive,you can be sure that Q uantity A is larger (this is true even if *x* is a fraction).

A lternatively,use sm art num bers.If *x* = 50,then Q uantity A equals:

$$\frac{50}{100}\times\frac{0.5}{100}\times\frac{40{,}000}{1}=(0.5)(0.5)(400)=100$$

Q uantity B equals:

$$\frac{0.05}{100}\times\frac{2{,}000}{100}\times\frac{(40)(50)}{1}=(0.05)(2)(4)(50)=20$$

Q uantity A is larger.

49.**216.**The percent increase from 2000 to 2001 is:

$$\text{Percent Change}=\frac{Difference}{Original}\times 100$$

$$\text{Percent Change}=\frac{20}{60}\times 100=33.\overline{3}\%$$

N ow ,apply a $33.\overline{3}\%$,or 1/3,increase to 2004's figure.Y ou can't type a repeating decim al into the calculator; instead,m ultiply 162 by 1/3 to get the am ount of increase,and then add to 162 for the new profit per student in 2005: (162) (1/3) + 162 = 216.

50.**(E).**First,w rite "*x* is 0.5% of *y*" as m ath.M ake sure you don't accidentally interpret 0.5% as 50% !

$$x=\frac{0.5}{100}\times y$$

The question asks "*y* is w hat percent of *x*?",so solve for *y*:

100*x* = 0.5*y*
200*x* = *y*

If *y* is 200 tim es *x,*m ultiply by 100 to convert to a percent:

$$\frac{200x}{1} \times \frac{100}{100} = \frac{20{,}000x}{100}$$

The answ er is 20,000% .(For reference,if one num ber is 2 tim es as big as the other,it is 200% the size — add tw o zeros.So,200 tim es as big = 20,000% .)

A lternatively,you could use sm art num bers.If *y* = 100,then $x = \frac{0.5}{100}(100) = 0.5$ .N ext,answ er the question "100 is w hat percent of 0.5?" Pick a new variable to translate the "w hat percent" portion of the sentence:

$$100 = \frac{n}{100} \times 0.5$$
$$10{,}000 = 0.5n$$
$$20{,}000 = n$$

(In translating percents problem s to m ath,alw ays translate "w hat percent" as a variable over 100.)

51.**(C).**B ill's tax is (0.20)5000 = $1,000.Thus,his rem aining salary is $4,000.H is rent is therefore (0.25)4000 = $1,000.

52.**(B).**If four people shared the $80 bill equally,then each person paid for one-quarter of the bill,or $80/4 = $20.

The tip is calculated as a percentage of the bill.B ecause the question asks about the am ount that each (one) person paid,you can calculate the 15% tip based solely on one person's portion of the bill ($20): (0.15)(20) = $3.

In total,each person paid $20 + $3 = $23.

A lternatively,you could find the total of the bill plus tip and take one-fourth of that for the total contribution of each person.The total of bill and tip is $80 + (0.15)(80) = $80 + $12 = $92.O ne-fourth of this is $92/4 = $23.

53.**(B).**U se a sm art num ber for the price of the stock;for a percent problem ,$100 is a good choice.The price of the stock after a 25% increase is (1.25) × $100 = $125.

N ext,find the percent decrease (*y*) needed to reduce the price back to the original $100.$125 - $25 = $100,so rephrase the question: 25 is w hat percent of 125?

$$25 = \frac{x}{100}(125)$$
$$\frac{2{,}500}{125} = x$$
$$x = 20$$

Y ou have to reduce 125 by 20% in order to get back to $100.Therefore,Q uantity A = 20% and is less than Q uantity B .

A lternatively,you can use algebra,although algebra is challenging for this problem .A ssign the original cost of the stock a variable,such as *z*.In this case,the price of the stock after a 25% increase w ould be 1.25*z*.The percent decrease,*y*,is found by m ultiplying 1.25*z* by $1-\frac{y}{100}$ and setting the quantity equal to the original price,*z*.

$$z=\left(1-\frac{y}{100}\right)(1.25z)$$

$$\frac{z}{1.25z}=1-\frac{y}{100}$$

$$\frac{1}{1.25}=1-\frac{y}{100}$$

$$0.8=1-\frac{y}{100}$$

$$-0.2=-\frac{y}{100}$$

M ultiply all term s by 100 in order to get rid of the fraction:

80 = 100 - *y*
y = 100 - 80 = 20

54.**(C).**The chem ist now has 10 ounces of acetone in a 30-ounce m ixture,so she m ust have 20 ounces of w ater.Y ou w ant to know the am ount of acetone you m ust add in order to m ake this m ixture a 50% solution.N o additional w ater is added,so the solution m ust finish w ith 20 ounces of w ater.Therefore,she also needs a total of 20 ounces of acetone, or 10 m ore ounces than the m ixture currently contains.

A lternatively,you can use algebra.If the chem ist adds *x* ounces of acetone to the m ixture,then there w ill be 10 + *x* ounces of acetone and the total m ixture w ill have 30 + *x* ounces.The goal is to have a m ixture that is 50% acetone:

$$50\%=\frac{10+x}{30+x}$$

$$\frac{50}{100}=\frac{10+x}{30+x}$$

$$\frac{1}{2}=\frac{10+x}{30+x}$$

C ross m ultiply:

$30 + x = 20 + 2x$
$10 = x$

The answ er is (C).

N ote that one trap answ er is (B),or 5.This answ er is not correct because the final num ber of ounces in the solution is *not* 30;w hen the chem ist adds acetone,the am ount of total solution also increases — adding 5 ounces acetone w ould result in a solution that is 15/(30 + 5) acetone,w hich is not equivalent to a 50% m ixture.

55.**(C).**C hoose a sm art num ber for the total num ber of gam es;for a percent problem ,100 is a good num ber to pick. If the total num ber of gam es for the season is 100 and the team played 80% of them by July,then the team played (100)(0.8) = 80 gam es.The team w on 50% of these gam es,or (80)(0.5) = 40 gam es.

N ext,the team w on 60% of its *rem aining* gam es.A s there w ere 100 total gam es and the team has played 80 of them , there are 20 gam es left to play.O f these,the team w on 60% ,or (20)(0.6) = 12 gam es.

Therefore,the team has w on a total of 40 + 12 = 52 gam es out of 100,or 52% of its total gam es.Q uantities A and B are equal.

A lternatively,this problem could be done using w eighted averages,w here the total percent of gam es w on is equal to the sum of all of the individual percentages m ultiplied by their w eightings.In this case,

Total Percentage W on = (50%)(80%) + (60%)(100% - 80%) × 100
Total Percentage W on = [(0.5)(0.8) + (0.6)(0.2)] × 100
Total Percentage W on = [(0.4) + (0.12)] × 100
Total Percentage W on = 0.52 × 100
Total Percentage W on = 52%

56.**(A).**In order to com pare,use the calculator to find 0.4 percent of 4 percent of 1.25 (be careful w ith the decim als!):

$0.004 \times 0.04 \times 1.25 = 0.0002$

O r,as fractions:

$$\frac{0.4}{100} \times \frac{4}{100} \times 1.25 = \frac{2}{1{,}000} = 0.0002$$

Q uantity A is larger than Q uantity B .

57.**(D).**O riginally,Jane has a 40-ounce m ixture of apple and seltzer that is 30% apple.Since 0.30(40) = 12,12 ounces w ere apple and 28 ounces w ere seltzer.

Jane pours 10 m ore ounces of apple juice into the m ixture,yielding a m ixture that is 50 ounces total,still w ith 28

ounces of seltzer.N ow ,the percentage of seltzer in the final m ixture is $\frac{28}{50} \times 100 = 56\%.$

58.**(A).**C hoose a sm art num ber for the total num ber of shirts in the closest;this is a percent problem ,so 100 is a good num ber to pick.O ut of 100 shirts,half,or 50,are w hite.

30% of the *rem aining* shirts are gray.If there are 50 w hite shirts,there are also 50 rem aining shirts and so (0.3)(50) = 15 gray shirts.Therefore,there are 50 + 15 = 65 total shirts that are w hite or gray,and 100 - 65 = 35 shirts that are neither w hite nor gray.Since 35 out of 100 shirts are neither w hite nor gray,exactly 35% of the shirts are neither w hite nor gray.

A lternatively,you can use algebra,though that is trickier on a problem such as this one.Set a variable,such as *x*,for the total num ber of shirts.The num ber of w hite shirts is 0.5*x* and the rem aining shirts w ould equal *x* - 0.5*x* = 0.5*x*.The num ber of gray shirts,then,is (0.5*x*)(0.3) = 0.15*x*.Thus there are 0.5*x* + 0.15*x* = 0.65*x* w hite or gray shirts,and *x* - 0.6*x* = 0.35*x* shirts that are neither w hite nor gray.0.35*x* ÷ *x* = 0.35,or 35% .

59.**(E).**A s there are no am ounts given in the problem ,you can choose a sm art num ber for the total num ber of children.O n percent problem s,100 is a good choice.The problem indicates that 80% of the children,or 80 children total,are m ore than 10 years old.

20 percent *of these 80 children* play an organized sport.The question asks about the percentage of these children w ho do N O T play an organized sport.If 20% do,then the rem aining 80% of the 80 children do not.(80)(0.8) = 64 children w ho are over 10 years old and do not play an organized sport.

A lternatively,you can use algebra;set the total num ber of children in the room equal to *x*.The problem indicates that 80% ,or 0.8*x*,of the children are over 10 years old.O f the 0.8*x* children,20% do play an organized sport,so 80% do not.(0.8*x*)(0.8) = 0.64*x*.Therefore,64% of the children are over 10 but do not play an organized sport.

60.**(B).**Y ou can choose sm art num bers for the dim ensions of the box — for instance,length = 20,w idth = 10,and height = 1.(For the length and the w idth,pick values that w ill still yield an integer w hen increased by 10% .Since the height doesn't change,pick an easy num ber such as 1 to keep the overall calculations easy.)

The original volum e of the box = length × w idth × height = 20 × 10 × 1 = 200

A fter a 10% increase for both the length and the w idth,the volum e becom es 22 × 11 × 1 = 242.

The form ula for percent change is:

$$\text{Percent Change} = \frac{\textit{Difference}}{\textit{Original}} \times 100$$

$$\frac{242 - 200}{200} = \frac{42}{200} = \frac{21}{100} = 21\%$$

Q uantity B is larger.

A lternatively,you could use algebra.A ssign the variables *l* to the original length,*w* to the original w idth,and *h* to the original height of the box.The volum e of the box w ould then be *lw h*.A 10% increase in the length and w idth changes the variables to 1.1*l* and 1.1*w* respectively.The new volum e of the box w ould be (1.1*l*)(1.1*w*)(*h*) = 1.21*lw h*,w hich constitutes a 21% increase over *lw h.*

Finally,you could use logic.The form ula for volum e requires m ultiplying the length and the w idth.If just one side is increased by 10% ,then the overall volum e w ill increase by 10% .If tw o sides are increased by 10% ,then the overall volum e w ill increase by som ething larger than 10% .

61.**(B).**Y ou can choose a sm art num ber for the radius of the circle.In this case,because no restrictions are placed on the radius,choose radius = 1 for convenience.The area of a circle is πr^2 and so the area is equal to $\pi 1^2 = \pi$.

The radius of the circle then doubles from 1 to 2.The new area of the circle is $\pi(2)^2 = 4\pi$.N ow calculate the percent increase in the area of the circle:

$$\text{Percent Change} = \frac{Difference}{Original} \times 100$$

$$\text{Percent Change} = \frac{4\pi - \pi}{\pi} \times 100 = \frac{3\pi}{\pi} \times 100 = 300\%$$

Q uantity B is larger.

A lternatively,you can use algebra.A ssign the variable *r*,giving an original circle area of πr^2.A fter the radius is doubled to 2*r*,the new area becom es $\pi(2r)^2 = 4\pi r^2$.A gain,use the form ula for percent increase:

$$\text{Percent Change} = \frac{4\pi r^2 - \pi r^2}{\pi r^2} \times 100 = \frac{3\pi r^2}{\pi r^2} \times 100 = 300\%$$

62.**(C).**Translate the given inform ation into m ath:

$$\frac{35}{100}x = 140$$

$$x = 140 \times \frac{100}{35}$$

$$x = 400$$

N ext,find 20% of *x*,or 0.20(400) = 80.

63.**(A).**Every 3 m inutes,the population increases by 20% (w hich is the sam e as m ultiplying by 1.2).B eginning at 8:54am ,this change w ould occur at 8:57am and again at 9:00am .U se the variable *x* to represent the original quantity. N ote that the 20% increase occurs tw ice:

$x(1.2)(1.2) = 144{,}000$
$x = 100{,}000$

N ote that you cannot sim ply reduce 144,000 by 20% tw ice,because 20% is not a percentage of 144,000 — it is a percentage of the unknow n,original num ber.

A lternatively,you could begin from 144,000 and calculate “backw ards”:

From 8:57am to 9:00am : $y(1.2) = 144{,}000$,so $y = 144{,}000/1.2 = 120{,}000$.

From 8:54am to 8:57am : $z(1.2) = 120{,}000$,so $z = 120{,}000/1.2 = 100{,}000$.

64.**(D).**C all the first test score x.A 15% increase and then a 25% decrease yields 69.Thus:

$x(1.15)(0.75) =$
$69x = 80$

A lternatively,begin from the final score,69,and solve “backw ards”:

25% decrease from 2nd test to 3rd test: $y(0.75) = 69$,so $y = 92$.2nd test w as 92.

15% increase from 1st test to 2nd test: $z(1.15) = 92$,so $z = 80$.1st test w as 80.

65.**(D).**R educing a num ber by a percentage involves m ultiplication;reducing a num ber by a fixed am ount involves subtraction.The order of operations (PEM D A S) w ill m ake a difference.

O ne possible value for the item is $100.In this case,the value of Q uantity A = (100)(0.9) - 20 = $70.The value of Q uantity B = (100 - 10)(0.80) = $72.H ere,Q uantity B is larger.

H ow ever,a larger starting value m ay change the result,because a 20% discount off a larger starting value can result in a m uch bigger decrease.For a $140 item ,the value of Q uantity A = (140)(0.9) - 20 = $106.The value of Q uantity B = (140 - 10)(0.80) = $104.H ere,Q uantity A is larger.The answ er is (D).

66.**(C).**Y ou can pick sm art num bers since there are no am ounts specified.Each person in class 1 stacks 80 percent as m any boxes as each person in class 2.Y ou can choose 80 and 100,but it’s better to pick sm aller num bers to m ake the later m ath easier.

C lass 1 = 8 blocks per person
C lass 2 = 10 blocks per person

There are 25% m ore people in class 1 than class 2.If there are 4 people in class 2,then there are (4)(1.25) = 5 people in class 1.

B locks Stacked by C lass 1 = 8 people × 5 blocks per person = 40 blocks

B locks Stacked by C lass 2 = 10 people × 4 blocks per person = 40 blocks

Since each class stacks 40 blocks,each class stacks 50% of the total blocks.The quantities are equal.

A lternatively,you could use algebra.

C lass 1 = 0.8*x* blocks per person
C lass 2 = *x* blocks per person
C lass 1 = 1.25*y* people
C lass 2 = *y* people

The total blocks stacked by class 1 = (0.8*x*)(1.25*y*) = *xy*.The total blocks stacked by class 2 = *xy*.Since each class stacks the sam e num ber of blocks,each class stacks 50% of the total blocks.

67.**(D).**B ecause the problem does not specify any real values for the variables,you can test your ow n num bers.Y ou m ight be tem pted to choose 100 for *z*,but then *x* and *y* w ill be the sam e;for exam ple,60 is 60 percent of 100.It's better to pick three different values for the three variables.

O ne possible case: 4 is 40% of 10.In this exam ple,*x* = 4,*y* = 40,and *z* = 10.The value of Q uantity A is *z*/*x* = 10/4 =2.5,or 250% .The value of Q uantity B is 40/10,000,or 0.4% .In this exam ple,Q uantity A is larger.

W ill that alw ays be true? O r w ill a larger or sm aller num ber change the result? In Q uantity B ,*y* is divided by a static num ber: 10,000 never changes.If *y* is a m uch larger num ber,then,perhaps Q uantity B w ill becom e larger than Q uantity A .

Try *y* = 10,000.A lso change *x* and *z* to m ore m anageable num bers.400 is 10,000% of 4.(N ote: 4 is 100% of 4.40 is 1,000% of 4.400 is 10,000% of 4.) In this exam ple,*x* = 400,*y* = 10,000,and *z* = 4.The value of Q uantity A is *z*/*x* = 4/400 = 1/100,or 1% .The value of Q uantity B is 10,000/10,000 = 1.In this case,the tw o quantities are equal. Therefore,the answ er is (D).

Y ou can also use algebra,though the algebra is challenging for this problem .Translate the given equation,*x* is *y* percent of *z*:

$$x = \frac{y}{100} \times z$$

Translate Q uantity A ,the percent that *z* is of *x*;you can rephrase as "*z* is w hat percent of *x*?" N ote that you have to introduce a new variable:

$$z = \frac{p}{100} \times x$$

Solve for *p* because Q uantity A is asking for the unknow n percent:

$$\frac{100z}{x} = p$$

Q uantity B contains an expression that uses only the variable *y*,w hile Q uantity A contains 3 variables.U se the given equation to try to w rite the left-hand side of Q uantity A only in term s of *y*:

Given: $x = \frac{y}{100} \times z$

$$\frac{x}{z} = \frac{y}{100}$$

$$\frac{z}{x} = \frac{100}{y}$$

Substitute for the $\frac{z}{x}$ term in the equation for Q uantity A :

$$(100)\left(\frac{100}{y}\right) = p$$

$$\frac{10{,}000}{y} = p$$

Q uantity A equals $\frac{10{,}000}{y}$ and Q uantity B equals $\frac{y}{10{,}000}$.W ithout know ing the value of *y*,how ever,it is im possible to determ ine that one quantity is larger.Specifically,if *y* is less than 10,000,Q uantity A is larger,but if *y* is greater than 10,000,Q uantity B is larger.The answ er is (D).

68.**(B).**20% less than 300 is the sam e as 80% of 300,or 0.80(300) = 240.The question is “240 is w hat percent greater than 180?”

$$\text{Percent Change} = \frac{\textit{Difference}}{\textit{Original}} \times 100$$

$$\text{Percent Change} = \frac{60}{180} \times 100 = 33.\overline{3}\%$$

69.**(D).**First find the volum e of oil in the bucket.The oil fills 35% of the bucket’s 20-gallon volum e,or (20)(0.35) = 7 gallons of oil

These 7 gallons originally filled 40% of the tank.C all the volum e of the tank *T*.*T*(0.4) = 7,so *T* = 17.5 gallons.

70.**(A).**“200% larger” m eans “*three* tim es as big as” the original;“200% as large as” w ould m ean tw ice as big.If the pitcher is three tim es as big as the glass,then pouring the contents of the glass into the pitcher w ill m ake the pitcher 1/3 full.If adding another 16 ounces fills up the pitcher,the 16 ounces m ust be equal to the rem aining 2/3 of the pitcher’s capacity.1/3 of the pitcher’s capacity,then,is 16/2,or 8 ounces.The juice m ixture totals 8 ounces.20% of the juice is grape juice,so there are (8)(0.2) = 1.6 ounces of grape juice.

71.**(A).**First,find the value of 150 increased by 60% : (150)(1.6) = 240.240 is then decreased by *y* percent to get 192.240 - 192 = 48,so 240 is decreased by 48 to get 192.R ephrase the question: 48 represents w hat percentage of 240?

$$48 = \frac{x}{100}(240)$$

$$48\left(\frac{10}{24}\right) = x$$

$$x = 20$$

72.**(D).**“150% greater than 200” m eans 150% of 200,or 300,*added back to* 200.This is the not the sam e figure as 150% *of* 200.Thus,150% greater than 200 is 200 + (200)(1.5) = 500.

50% of 500 = 250.Translate the question as “W hat percent greater is 500 than 250?” Since 500 is tw ice 250,it is 100% greater than 250.

A lternatively,use the percent change form ula.

$$\text{Percent Change} = \frac{\textit{Difference}}{\textit{Original}} \times 100$$

$$\text{Percent Change} = \frac{500 - 250}{250} \times 100 = 100\%$$

73.**(C).**First,the question asks you to find the percent of the com bination that is N O T alum inum .If M ixture A is 50% alum inum ,then it is also 50% N O T alum inum .M ixture A w eighs 18 gram s,so the portion that is N O T alum inum is (18)(0.5) = 9 gram s.

If M ixture B is 37.5% (or 3/8) alum inum ,then it is 100% - 37.5% = 62.5% (or 5/8) N O T alum inum .M ixture B w eighs 32 gram s,so the portion that is N O T alum inum is (32)(5/8) = 20.

20 + 9 = 29 gram s are N O T alum inum out of the 18 + 32 = 50 total gram s.The percentage is 29/50 = 58/100 = 58% .

The tw o quantities are equal.

74.**(B).**The stockbroker has m ade a profit on 80% of his 40 trades this year,so (0.80)(40) = 32 of his trades so far have been profitable.

Q uantity B asks for the m axim um num ber of additional losses in a row he can have w ithout dropping below 50% .If he stays at 32 profitable trades and 8 non-profitable trades,and all future trades are losses,then he can’t go above 32 × 2 = 64 trades w ithout dropping below a 50% success rate.A t 64 trades exactly,he w ould have 32 profitable trades and 32 non-profitable trades,for a “success” percentage of 50% profitable trades.64 - 40 = 24 trades,so he can have 24 losses in a row w ithout dropping *below* 50% .Q uantity B is larger.

A lternatively,you can use algebra.Set the num ber of additional losing trades (above 40) to *x*.Then,the num ber of w inning trades w ill rem ain constant at 32,the total num ber of trades w ill increase to 40 + *x*,and the total num ber of losing trades w ill be 8 + *x*.Q uantity B asks for the m axim um num ber of additional losses in a row he can have w ithout dropping below 50% of profitable trades,so set up an inequality.The percentage of profitable trades m ust be greater than or equal to 50:

$$\frac{\text{Number Profitable}}{\text{Total Number}} \times 100 \geq 50$$

$$\frac{32}{40+x} \times 100 \geq 50$$

$$\frac{32}{40+x} \geq \frac{1}{2}$$

C ross m ultiply (note: you know the variable represents a positive num ber,so you don't need to do anything to the inequality sign):

$64 \times 40 + x$

$24 \times x$

Therefore,the stockbroker can lose m oney on 24 trades in a row and still have 50% of trades be profitable,so Q uantity B is 24.Q uantity B is larger.

75.**(D).**C andidate A had a 5% increase in votes betw een 2011 and 2012;a percent increase is calculated based upon the "original" num ber,w hich in this case w as the num ber of votes for C andidate A in 2011.This 5% increase w as equivalent to 3 total votes.Y ou can use algebra to solve;let *x* equal the num ber of votes for C andidate A in 2011.

$$\frac{5}{100} = \frac{3}{x}$$

$$\frac{1}{20} = \frac{3}{x}$$

$$x = 60$$

A lternatively,if 5% = 3,then 50% = 30 (m ultiply both sides by 10) and 100% = 60 (m ultiply both sides by 2).

Therefore,C andidate A received 60 votes in 2011.The problem also indicates that C andidate A received 40% of the total vote in 2011.Y ou can solve for the total votes and subtract to find the num ber of votes for C andidate B : Let *T* equal the total num ber of votes in 2011.

$60 = (0.4)T$

150 = *T*

T - *A* = 150 = 60 = 90 votes for C andidate B in 2011.

A lternatively,you could set up a proportion to solve.The advantage of this m ethod: you w on't solve for the total num ber of votes,so you w on't get distracted by trap w rong answ er (E).60 votes represent 40% of the total,and you w ant to solve for 60% of the total:

$$\frac{60 \text{ (A votes)}}{40 \text{ (\% of total votes)}} = \frac{x \text{ (B votes)}}{60 \text{ (\% of total votes)}}$$

$$\frac{3}{2} = \frac{x}{60}$$

$$180 = 2x$$

$$x = 90$$

76.**(C).**A 16-ounce jar that is 10% sesam e has 1.6 ounces of sesam e.From there,you m ight infer that all you need to do is add 1.6 ounces again,and the m ixture w ill be 20% sesam e.H ow ever,this is incorrect — adding 1.6 ounces of sesam e w ill also add 1.6 ounces to the total am ount of seed in the jar.3.2 ounces sesam e/17.6 ounces total = 18.18% w hich is N O T equal to 20% .

Instead,w rite an equation expressing the ratio of sesam e to the total m ixture,w here *x* is the am ount of sesam e to add; this equals the desired 20% (or 1/5) figure:

$$\frac{1.6 + x}{16 + x} = \frac{1}{5}$$

C ross m ultiply:

5(1.6 + *x*) = 16 + *x*
8 + 5*x* = 16 + *x*
4*x* = 8
x = 2

77.**(C).**It is alw ays the case that,for tw o positive quantities,*M* % of *N* = *N* % of *M* .In this case,(*a* + *b*) m akes the problem appear m ore com plicated,but the principle still applies.A lgebraically:

Q uantity A	**Q uantity B**
$\frac{(a+b)}{100} \times c$	$\frac{c}{100} \times (a+b)$

$\frac{c(a+b)}{100}$

B oth quantities can be sim plified to equal .

78.**(E).**This problem is best solved w ith a double-set m atrix.Since all figures are given in percents or fractions (no real num bers of boats),you can use any num ber you w ant for the total;100 is the easiest choice.Since 25% of 100 = 25 boats are used sailboats and 33% of 100 = 33 boats are used,you can infer that 33 - 25 = 8 boats are used non-sailboats:

	sailboat	**non-sailboat**	**Total**
new			
used	25	8	33
Total			100

Y ou are told that *of non-sailboats,*3/5 (or 60%) are new .Since you don't know the num ber of non-sailboats:

	sailboat	**non-sailboat**	**Total**
new		0.6*x*	
used	25	8	33
Total		*x*	100

Since,in the non-sailboat colum n,new + used = total:

0.6*x* + 8 = *x*
8 = 0.4*x*
20 = *x*

This is enough to fill in the rest of the chart:

	sailboat	**non-sailboat**	**Total**
new	55	12	67
used	25	8	33
Total	80	20	100

Y ou can now see that 55/80 of the sailboats are new .This is 68.75% .R ounded to the nearest percent,the answ er is 69% .

79.**(B).**H elen bought a ticket for $252;if she had bought it 1 day later,she w ould have paid $54 m ore.There are three possibilities that represent the dividing lines betw een the given discount levels:

Possibility 1: She bought the ticket 60 days in advance for a 40% discount (if she'd bought it 1 day later,

or 59 days in advance,she w ould have received a 30% discount instead).

Possibility 2: She bought the ticket 30 days in advance for a 30% discount (if she'd bought it 1 day later, or 29 days in advance,she w ould have received a 15% discount instead).

Possibility 3: She bought the ticket 5 days in advance for a 15% discount (if she'd bought it 1 day later,or 4 days in advance,she w ould not have received any kind of discount).

This question is harder than it looks,because you cannot just calculate a percent change betw een $252 and $306.The discounts are *percentages of the full-price ticket*,and you don't know that num ber.C all it *x*.

D o note that the only three possible answ ers are 5,30,and 60 (answ ers (A),(B),and (D),respectively).59 days ahead and 89 days ahead do not represent days for w hich the next day (58 and 88 days ahead,respectively) results in a change in the discount.

Possibility 1 (60 days in advance): $252 w ould represent a 40% discount from the original price,so the original price w ould be 252 = 0.6*x*,and *x* w ould be $420.

If the full ticket price is $420,then buying the ticket 1 day later w ould result in a 30% discount instead,or (420)(0.7) = $294.The problem indicates,how ever,that H elen w ould have paid $306,so Possibility 1 is not correct.

Possibility 2 (30 days in advance): $252 w ould represent a 30% discount from the original price,so the original price w ould be 252 = 0.7*x* and *x* w ould be $360.

If the full ticket price is $360,then buying the ticket 1 day later w ould result in a 15% discount instead,or (360) (0.85) = $306.This m atches the figure given in the problem ,so Possibility 2 is correct;you do not need to test Possibility 3.H elen bought the ticket 30 days in advance.